

Little Wood River Subbasin Assessment and Total Maximum Daily Load



Department of Environmental Quality

Final, August 2005

Little Wood River Subbasin Assessment and TMDL

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Acknowledgments

Samples for the Little Wood River Subbasin Assessment and Total Maximum Daily Load were collected by Jennifer Claire and environmental consulting firms. Reservoir data was collected by Clyde Lay and Jennifer Claire. Habitat data was collected by Jennifer Claire, Alan Monek, and Sean Woodhead. ArcView figures were compiled by Rob Sharpnack. Clyde Lay and Sonny Buhidar reviewed the document throughout the process. Sean Woodhead and many of the Beneficial Use Reconnaissance Program crews collected the biological data. Mark Shumar provided aerial interpretation of canopy cover for temperature TMDLs. Dennis Meier provided technical edit suggestions for the document. The Wood River WAG provided public feedback and input throughout the process. Cover photo of the Little Wood River near Gooding taken by Jennifer Claire.

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Abbreviations, Acronyms, and Symbols

§303(d)	Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section	DEQ	Department of Environmental Quality
μ	micro, one-one thousandth	DO	dissolved oxygen
§	Section (usually a section of federal or state rules or statutes)	DWS	domestic water supply
ADB	assessment database	EPA	United States Environmental Protection Agency
AU	assessment unit	F	Fahrenheit
AWS	agricultural water supply	GIS	Geographical Information Systems
BAG	Basin Advisory Group	HUC	Hydrologic Unit Code
BLM	United States Bureau of Land Management	IDAPA	Refers to citations of Idaho administrative rules
BMP	best management practice	IDFG	Idaho Department of Fish and Game
BOD	biochemical oxygen demand	IDWR	Idaho Department of Water Resources
BURP	Beneficial Use Reconnaissance Program	km	kilometer
C	Celsius	km²	square kilometer
CFR	Code of Federal Regulations (refers to citations in the federal administrative rules)	kWh/day	kilowatt hour per day
cfs	cubic feet per second	LA	load allocation
cm	centimeters	LC	load capacity
CWA	Clean Water Act	m	meter
CWAL	cold water aquatic life	m³	cubic meter
		mi	mile
		mi²	square miles

MGD	million gallons per day	SMI	DEQ's stream macroinvertebrate index
mg/L	milligrams per liter	SS	salmonid spawning
mm	millimeter	TIN	total inorganic nitrogen
MOS	margin of safety	TMDL	total maximum daily load
n.a.	not applicable	TP	total phosphorus
NA	not assessed	TS	total solids
NB	natural background	TSS	total suspended solids
nd	no data (data not available)	t/y	tons per year
NPDES	National Pollutant Discharge Elimination System	U.S.	United States
NRCS	Natural Resources Conservation Service	U.S.C.	United States Code
NTU	nephelometric turbidity unit	USDA	United States Department of Agriculture
ORV	off-road vehicle	USFS	United States Forest Service
PCR	primary contact recreation	USGS	United States Geological Survey
PFC	proper functioning condition	WAG	Watershed Advisory Group
ppm	part(s) per million	WBAG	<i>Waterbody Assessment Guidance</i>
QA	quality assurance	WBID	water body identification number
QC	quality control	WLA	wasteload allocation
RHCA	riparian habitat conservation area	WQLS	water quality limited segment
SBA	subbasin assessment	WQS	water quality standard
SCR	secondary contact recreation		
SFI	DEQ's stream fish index		
SHI	DEQ's stream habitat index		

Executive Summary

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list of impaired waters, currently every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards. This document addresses the water bodies in the Little Wood River Subbasin that have been placed on what is known as the "§303(d) list."

This subbasin assessment and TMDL analysis has been developed to comply with Idaho's TMDL schedule. This assessment describes the physical, biological, and cultural setting; water quality status; pollutant sources; and recent pollution control actions in the Little Wood River Subbasin located in south central Idaho. The first part of this document, the subbasin assessment, is an important first step in leading to the TMDL. The starting point for this assessment was Idaho's current §303(d) list of water quality limited water bodies. Ten segments of the Little Wood River Subbasin were included on this list. The subbasin assessment portion of this document examines the current status of §303(d) listed waters, and defines the extent of impairment and causes of water quality limitation throughout the subbasin. The loading analysis quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition of meeting water quality standards.

Subbasin at a Glance

The Little Wood River Subbasin lies in south central Idaho (Figure 1). The Little Wood River is the main water body that drains the subbasin. The headwaters of the river originate in the Pioneer Mountains of the Sawtooth National Forest and discharge in the desert plains at the Big Wood River. The Northern Rockies, Snake River Plain/High Deserts and transitional zones between the two ecoregions represent the ecoregions of the subbasin.

Hydrologically, there is a great deal of activity occurring within the subbasin:

- Runoff events in the spring months and precipitation events in the fall months feed many of the water bodies.
- Ground water also plays a role in that many of the springs of the subbasin provide perennial base flow throughout the region.
- Ground water plays a larger role in the southern part of the subbasin, where the spring-fed system, Silver Creek, contributes a large percentage of the flow to the Little Wood River.

- The land uses of the subbasin also require the diversion of water from their natural channels and/or the use of natural channels as a transport channel for waters from other subbasins. In many cases, segments of water bodies are dewatered for the majority of the year.

Hydrology is, therefore, an important component to consider when determining the impacts to water quality in the Little Wood River Subbasin.

The land of the subbasin is used in a number of ways by a number of entities:

- The majority of the subbasin is privately owned or publicly owned and managed by the Bureau of Land Management (BLM.)
- Overall the vegetation of the subbasin is more conducive to rangeland activities, therefore there is a lot of rangeland use followed by some irrigated agriculture use that occurs in the valleys or flood plains of the water bodies.
- Most activity within the subbasin is nonpoint source activity.
- Point sources within the subbasin include four city wastewater treatment facilities, one aquaculture facility, two food processing facilities, and one industrial facility.

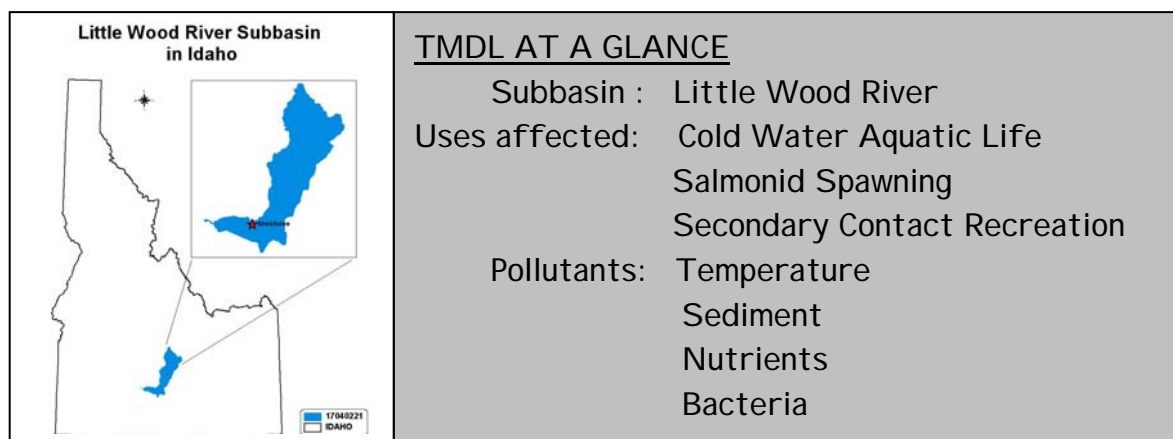


Figure 1. Subbasin at a glance.

There are eleven water body segments of the Little Wood River Subbasin that have been identified as being impaired (Figure 2). Many of these water bodies were identified on the 1998 303(d) list as being impaired by bacteria, dissolved oxygen, nutrients, sediment, flow alteration, or unknown pollutants. EPA also identified Muldoon Creek and segments of the Little Wood River as being impaired by temperature. These pollutants may be impacting the beneficial uses of the subbasin, which includes cold water aquatic life, salmonid spawning, primary contact recreation, and secondary contact recreation. Pollutants were identified in the 1998 303(d) list as impacting water quality (Table 1).

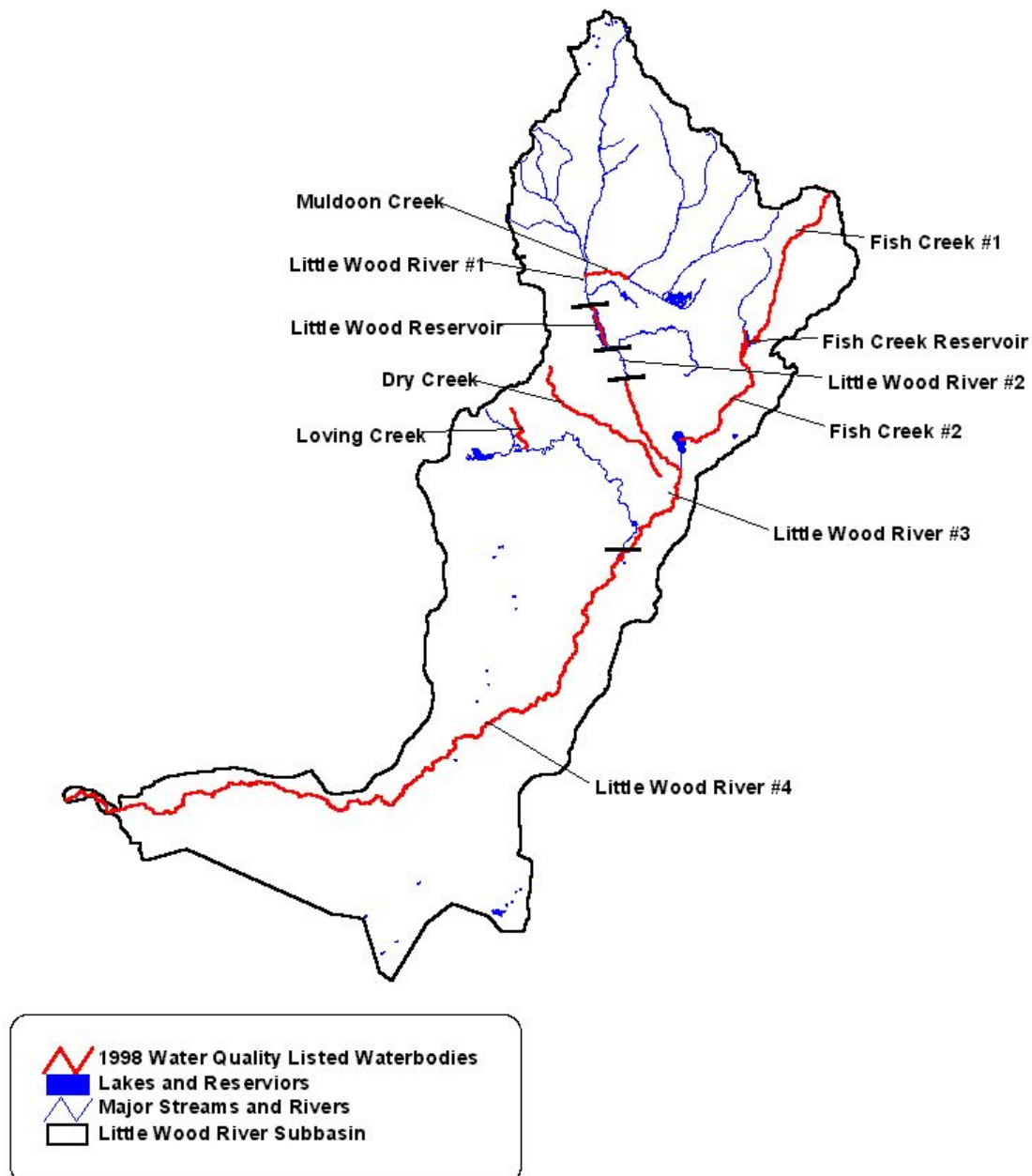
Table 1. Impaired waters of the Little Wood River Subbasin (1998).

Water body Name	Assessment Unit	1998 §303(d) Boundaries	1998 §303(d) listed Pollutants of Concern
Dry Creek	ID17040221SK022_02 ID17040221SK022_03	Headwaters to mouth	BAC, NUT, DO, SED, QALT
Fish Creek (above the reservoir)	ID17040221SK008_02 ID17040221SK008_03 ID17040221SK008_04	Headwaters to Fish Creek Reservoir	BAC, NUT, DO, SED, QALT
Fish Creek (below the reservoir)	ID17040221SK006_03 ID17040221SK006_04	Fish Creek Reservoir Dam to Carey Lake	BAC, NUT, DO, SED, QALT
Little Wood River #3	ID17040221SK010_05a ID17040221SK003_05	East Canal diversion to Silver Creek	NUT, SED, TEMP
Little Wood River #4	ID17040221SK002_05	Silver Creek to Richfield (town)	NUT, SED, TEMP
Little Wood River #4	ID17040221SK001_05 ID17040221SK001_05a ID17040221SK001_05b	Richfield to Big Wood River	BAC, DO, NUT, SED, QALT, TEMP
Muldoon Creek	ID17040221SK014_04	South Fork Muldoon Creek to mouth	UNK
Muldoon Creek	ID17040221SK014_02 ID17040221SK014_03 ID17040221SK014_04	Headwaters to mouth	TEMP
Loving Creek	ID17040221SK023_02	Headwaters to mouth	UNK
Little Wood River Reservoir	ID17040221SK012L_0L		BAC, DO, NUT, SED, QALT
Fish Creek Reservoir	ID17040221SK005L_0L		BAC, DO, NUT, SED, QALT

^a1998 303(d) refers to a list created in 1998 of water bodies in Idaho that did not fully support at least one beneficial use. This list is required under section 303 subsection “d” of the Clean Water Act.

^bPollutants : BAC – Bacteria, DO – Dissolved Oxygen, NUT – Nutrients, SED – Sediment, QALT – Flow alteration, UNK – Unknown, TEMP – temperature.

Little Wood River Subbasin 1998 303(d) Listed Waterbodies



Prepared by Rob Sharpnack - October 2000

Figure 2. Impaired water bodies of the Little Wood River Subbasin.

Key Findings

Biological and water chemistry data were used to determine if beneficial uses of the water bodies were fully supported:

- When biological and water chemistry data indicated that beneficial uses were being fully supported, the water bodies were proposed for delisting.
- When biological data indicated that beneficial uses were not fully supported, water chemistry data was used to identify the pollutant impacting beneficial uses.
- If a pollutant was not impacting a water body it was delisted.
- If a pollutant was identified as impacting beneficial uses, load allocations for appropriate point and nonpoint sources were completed.

There were a number of cases in which flow alteration was found to be a source of pollution impacting the water body. When flow has been identified as the pollution, a TMDL is not completed. The water body is identified as being impacted by flow alteration and put on a list of water bodies identified as being impacted by flow alteration.

Temperature elevations occurred in many of the water bodies, and temperature TMDLs were completed. A number of activities contribute to these temperature elevations, including canopy cover deficiencies resulting from land management practices, beaver dam complexes, and geologic formations such as basalt and lava flows that retain heat and may inhibit sufficient riparian development, flow alteration, ground water influences, and desert conditions of south central Idaho.

The pollutants that were impacting beneficial uses of the subbasin were nutrients, sediment, bacteria, and temperature:

- Nutrients were measured in the form of total phosphorus (TP) and total inorganic nitrogen (TIN). The average annual or monthly TP values elevated above 0.100 mg/L may indicate impairment of a water body. For water bodies flowing into a storage system average annual or monthly TP values elevated above 0.050 mg/L may indicate excessive delivery of nutrients to the storage system by the water body. These targets are the targets recommended by EPA in their Quality Criteria for Water 1986, Gold Book. Ideally, the monthly average would be used to determine if impairment was occurring. However, monitoring designs did not allow for a monthly average to be determined. As a result the daily maximum values of 0.160 mg/L or 0.080 mg/L were likely to be elevated in combination with the annual average of 0.100 mg/L or 0.050 mg/L. According to the Idaho water quality status report 1980 and the USFS Salmonid-habitat relationships in the Western United States concentrations of TIN above 0.300 mg/L will allow the development of biological nuisances and accelerate eutrophication (Buhidar 2004). *Therefore, annual averages for TIN greater than 0.300 mg/L, in combination with elevated TP levels, indicate that nutrients could be at levels that are capable of contributing to nuisance aquatic growth in the water body.*

- Sediment was measured in the water column as total suspended solids (TSS) and as percent fines for bed load sediment. The European Inland Fisheries Advisory Commission has suggested limits for TSS; these limits have been used in various south central Idaho TMDLs including the Bruneau and Big Wood River TMDLs. *The annual and monthly average target for TSS is 50 mg/L.* Monthly and annual averages elevated above this value may indicate impairment of the water body. Ideally, the monthly average would be used to determine if impairment was occurring. *However, monitoring designs did not allow for a monthly average to be determined.* As a result, the daily maximum value of 80 mg/L will be used to determine if monthly averages were likely to be elevated in combination with the annual averages of 50 mg/L. *For bedload sediment,* fully supported water bodies within the subbasin indicate that a water body is capable of fully supporting its beneficial uses when percent fines are 35% or less. As a result percent fine data elevated above 35% indicate that impairment of the water body is likely. When it was found that percent fines were elevated, stream bank erosion inventories were completed to determine if stream banks were the source of sediment. *Stream banks with stability less than 80% indicate that stream banks are delivering an excessive source of sediment within the system.*
- Bacteria and temperature are both numeric water quality standards and, as such, have numerical values that have to be met. Bacteria, in the form of *Escherichia coli* (*E. coli*), cannot exceed 406 colony forming units (cfu)/100 ml for primary contact recreation beneficial uses or 576 cfu/100ml for secondary contact beneficial uses. When these values are exceeded, four additional samples must be collected within 30 days. The geometric mean of the five samples are not to exceed a geometric mean of 126 cfu/100 ml.
- Temperature water quality standards differ for cold water aquatic life (CWAL) and salmonid spawning (SS) beneficial uses. Both maximum and average daily temperatures are not to exceed numeric criteria more than 10% of the time during critical time periods. Maximum and average daily temperatures for CWAL are 22 degrees C and 19 degrees C. Maximum and average daily temperatures for SS are 13 degrees C and 9 degrees C. If these temperatures are elevated more than 10% of the time, then temperature is impacting beneficial uses as numeric criteria supersede biological data. However it has been found, in some of the water bodies, that biological data indicates that beneficial uses despite temperature elevations are fully supported. When temperature data was elevated canopy cover of the water body was measured to develop a total maximum daily load (TMDL) for the water body.

Total maximum daily loads have been completed on five of the listed water bodies, addressing the pollutants described in the preceding:

- Nutrient TMDLs have been completed on both segments of Fish Creek, with the reservoir to be included in the implementation plans, and on the two listed segments of the Little Wood River from Silver Creek to the Big Wood River.

- Stream bank erosion TMDLs for sediment have been completed on Dry Creek, both segments of Fish Creek, and the Little Wood River from Silver Creek to the Big Wood River.
- A bacteria TMDL has been completed on the upper segment of Fish Creek from the headwaters to the reservoir.
- Temperature TMDLs have been completed on Loving Creek, Muldoon Creek, both segments of Fish Creek, and segments 1 and 4 of the Little Wood River.

Flow alteration has been identified as pollution for many of the water bodies. Water bodies listed as impacted by flow alteration include segments 3 and 4 of the Little Wood River, Fish Creek from the reservoir to Carey Lake, and Dry Creek. Flow alterations have left a segment of each of these water bodies dry for the majority of the year if not the whole year.

The following tables (Table 2 and Table 3) identify loads and decisions that were made for each of the water bodies.

Table 2. Streams and pollutants for which TMDLs were developed.

Stream	Pollutant(s)
Little Wood River #1 (headwaters to reservoir)	Temperature
Little Wood River #4 (Silver Creek to Big Wood River)	Sediment, Nutrients, Temperature
Fish Creek (above reservoir)	Sediment, Nutrients, Bacteria, Temperature
Fish Creek (below reservoir)	Sediment, Nutrients, Temperature
Dry Creek	Sediment
Muldoon Creek	Temperature
Loving Creek	Temperature

Table 3. Summary of assessment outcomes.

Water Body Segment	Assessment Unit	Pollutant	TMDL Done	Recommended Changes to §303(d) List	Justification
Little Wood River #1	ID17040221SK020_02 ID17040221SK020_03 ID17040221SK020_04 ID17040221SK020_05 ID17040221SK013_05	TEMP	Yes	List TEMP	Temperature violation
Little Wood River #2	ID17040221SK010_05	None	No	None	---
Little Wood River #3	ID17040221SK010_05a ID17040221SK003_05	None	No	List QALT, Delist SED, NUT, TEMP,	Water body dewatered
Little Wood River #4	ID17040221SK002_05 ID17040221SK001_05 ID17040221SK001_05a ID17040221SK001_05b	NUT, SED, TEMP	Yes	Delist BAC, DO	Meeting standards
Little Wood River Reservoir	ID17040221SK012L_0L	None	No	Delist for BAC, DO, NUT, SED	Meeting criteria
Dry Creek	ID17040221SK022_02	SED	Yes	Delist BAC, DO, NUT	Meeting criteria
Fish Creek (above)	ID17040221SK008_02 ID17040221SK008_03 ID17040221SK008_04	SED,NUT, BAC,TEMP	Yes	Delist for DO, QALT	Meeting standards
Fish Creek (below)	ID17040221SK006_03 ID17040221SK006_04	SED,NUT, TEMP	Yes	Delist for BAC,DO	Meeting standards
Fish Creek Reservoir	ID17040221SK005L_0L	None	No	Delist for BAC, DO,NUT,SED	Meeting criteria
Muldoon Creek	ID17040221SK014_02 ID17040221SK014_03 ID17040221SK014_04	TEMP	Yes	Delist for Unknown	Pollutant identified
Loving Creek	ID17040221SK023_02	TEMP	Yes	Delist for Unknown	Pollutant identified

^a1998 303(d) refers to a list created in 1998 of water bodies in Idaho that did not fully support at least one beneficial use. This list is required under section 303 subsection “d” of the Clean Water Act.

^b Abbreviations: SED- sediment, NUT- nutrient, BAC- bacteria, TEMP- temperature, DO- dissolved oxygen, QALT- flow alteration.

^c Water body segments: Little Wood River #1- headwaters to reservoir, Little Wood River #2 – reservoir to canal diversions, Little Wood River #3- canal diversions to Silver Creek, Little Wood River #4- Silver Creek to Big Wood River, Fish Creek (above)- headwaters to reservoir, Fish Creek (below)- reservoir to Carey Lake.